

CLAIMS:

1. A reading apparatus for obtaining a line of image data stored on a surface, the reading apparatus comprising:
 - (a) a radiation source for directing a line of stimulating radiation onto a stimuable image carrier on the surface, generating a line of image-bearing radiation thereby;
 - (b) a sensing head for obtaining image data from the line of image-bearing radiation excited from the image carrier, the sensing head having a plurality of channels, each channel sensing a segment of the line of image-bearing radiation, each channel comprising:
 - (i) inverting optics for inverting the segment of the line of image-bearing radiation to form an inverted line segment image;
 - (ii) a sensor for providing image data for the inverted line segment image; and
 - (c) an image processor for accepting the image data obtained from sensing head channels and forming a line of image data according to the line of image-bearing radiation.
2. A reading apparatus according to claim 1 wherein the radiation source comprises a laser.
3. A reading apparatus according to claim 1 wherein the sensor comprises a charge-coupled device.
4. A reading apparatus according to claim 3 wherein the sensor is a time delayed integration sensor.
5. A reading apparatus according to claim 1 wherein the sensor comprises a CMOS device.

6. A reading apparatus according to claim 1 wherein the inverting optics are arranged in a shifted pattern, such that adjacent channels are spatially shifted with respect to the width of the line of excited radiation.
- 5 7. A reading apparatus according to claim 1 wherein the inverting optics provide magnification greater than 1:-1.
8. A reading apparatus according to claim 1 wherein the inverting optics provide magnification less than 1:-1.
- 10 9. A reading apparatus according to claim 1 further comprising a transport mechanism for controllably urging the image carrier past the sensing head for obtaining sequential lines of image data.
- 15 10. A reading apparatus for obtaining image data stored on a surface, comprising:
- (a) a radiation source for directing a line of stimulating radiation onto a stimuable image carrier on the surface, generating a line of image-bearing radiation thereby;
- 20 (b) a sensing head for obtaining image data from the line of image-bearing radiation excited from the image carrier, the sensing head having a plurality of channels, each channel sensing a segment of the line of image-bearing radiation, each channel comprising:
- (i) inverting optics for inverting the segment of the line of image-bearing radiation to form an inverted line segment image; and
- 25 (ii) a sensor for providing image data for the inverted line segment image;
- (c) an image processor for accepting the image data
- 30 obtained from sensing head channels and forming a line of image data according to the line of image-bearing radiation; and

(d) a transport mechanism for controllably urging the image carrier past the sensing head for obtaining sequential lines of image data.

11. A reading apparatus according to claim 10 wherein the
5 radiation source comprises a laser.

12. A reading apparatus according to claim 10 wherein the sensor comprises a charge-coupled device.

10 13. A reading apparatus according to claim 12 wherein the sensor is a time delayed integration sensor.

14. A reading apparatus according to claim 10 wherein the sensor comprises a CMOS device.

15 15. A reading apparatus according to claim 10 wherein the inverting optics are arranged in a shifted pattern, such that adjacent channels are spatially shifted with respect to the width of the line of excited radiation.

20 16. A reading apparatus according to claim 10 wherein the inverting optics provide magnification greater than 1:-1.

17. A reading apparatus according to claim 10 wherein the inverting optics provide magnification less than 1:-1.

25 18. A reading apparatus according to claim 10 wherein adjacent segments of the line are substantially contiguous.

19. A reading apparatus according to claim 10 wherein the
30 transport mechanism comprises a continuous belt.

20. A reading apparatus for obtaining a line of image data stored on a surface, comprising:

(a) a radiation source for directing a line of stimulating radiation onto a stimuable image carrier on the surface, generating a line of image-bearing radiation thereby;

(b) a first sensing head and a second sensing head for obtaining image data from the line of image-bearing radiation excited from the image carrier, each sensing head having a plurality of channels, each channel sensing a segment of the line of image-bearing radiation, and each channel comprising:

(i) inverting optics for inverting the segment of the line of image-bearing radiation to form an inverted line segment image;

(ii) a sensor for providing image data for the inverted line segment image; and

(c) an image processor for accepting the image data obtained from first and second sensing head channels and forming a line of image data according to the line of image-bearing radiation.

21. A reading apparatus according to claim 20 wherein with respect to the length of the line of image-bearing radiation, line segments sensed by channels on the first sensing head are offset from line segments sensed by channels on the second sensing head.

22. A reading apparatus according to claim 20 wherein the segments of the line of image bearing radiation for a channel are substantially contiguous.

23. A reading apparatus according to claim 20 wherein the radiation source comprises a laser.

24. A reading apparatus according to claim 20 wherein the sensor comprises a charge-coupled device.

25. A reading apparatus according to claim 24 wherein the sensor is a time delayed integration sensor.

26. A reading apparatus according to claim 20 wherein the sensor comprises a CMOS device.

27. A reading apparatus according to claim 20 wherein the inverting optics are arranged in a shifted pattern, such that adjacent channels for the first sensing head are spatially shifted with respect to the width of the line of excited radiation.

28. A reading apparatus according to claim 20 wherein the inverting optics for the first sensing head provide magnification greater than 1:-1.

29. A reading apparatus according to claim 20 wherein the inverting optics for the first sensing head provide magnification less than 1:-1.

30. A reading apparatus according to claim 20 further comprising a transport mechanism for controllably urging the image carrier past the first and second sensing heads for obtaining sequential lines of image data.

31. A method for obtaining a line of image data stored on a surface, comprising:

- (a) emitting a line of stimulating radiation onto a stimuable image carrier on the surface, generating a line of image-bearing radiation thereby;
- (b) generating image data from the line of image-bearing radiation excited from the image carrier by:

(i) optically inverting substantially congruent segments of the line of image-bearing radiation to form a plurality of images of inverted line segments;
(ii) sensing radiation from, and providing output data for, each image in the plurality of images of inverted line segments; and
(iii) forming a line of image data according to the output data for congruent images in the plurality of images of inverted line segments.

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32. A method for obtaining a line of image data according to claim 31 wherein the step of forming a line of image data comprises the step of inverting the output data for each image in the plurality of images of inverted line segments.

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33. A method for obtaining a line of image data according to claim 31 wherein the step of sensing radiation comprises the step of directing the images of inverted line segments to an array of light sensors.

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34. A method for obtaining a line of image data according to claim 31 wherein the step of optically inverting substantially congruent segments comprises the step of providing greater than 1:-1 magnification.

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35. A method for obtaining a line of image data according to claim 31 wherein the step of optically inverting substantially congruent segments comprises the step of providing less than 1:-1 magnification.

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36. A method for obtaining a line of image data according to claim 31 further comprising the step of urging the surface forward incrementally in a direction that is substantially orthogonal to the line of image-bearing radiation.

37. A method for obtaining an image formed from successive lines of image data stored on a surface, comprising a repeated sequence of:

(a) emitting a line of stimulating radiation onto a stimuable image carrier on the surface, generating a line of image-bearing radiation thereby;

(b) generating image data from the line of image-bearing radiation excited from the image carrier by:

(i) optically inverting congruent segments of the line of image-bearing radiation to form a plurality of images of inverted line segments;

(ii) sensing radiation from, and providing output data for, each image in the plurality of images of inverted line segments;

(iii) forming a line of image data according to the output data for congruent images in the plurality of images of inverted line segments; and

(c) urging the surface forward incrementally in a direction that is substantially orthogonal to the line of image-bearing radiation.